

REMARKS

In the Office Action dated March 10, 2006, Claims 1-24 are pending and under consideration on the merits. Claim 18 is objected to for certain informalities. Claims 1-24 are rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent No. 4,675,296 to Lehmussaari et al. ("the '296 Patent") in view of Marinchenko et al. (*Appl. Biochem. Microbiol.* 15(6): 670-73 (1979)).

This Response addresses each of the Examiner's rejections. Applicant therefore respectfully submits that the present application is in condition for allowance. Favorable consideration of all pending claims is therefore respectfully requested.

Claim 18 is objected to for certain informalities. The Examiner states that the significance of the quotation marks after the period is unclear. The Examiner requires appropriate correction. Applicant respectfully submits that the quotation mark after the period at the end of Claim 18 is a typographical error. Applicant has made appropriate correction in accordance with the Examiner's requirement. No new matter is introduced.

As such, the objection to Claim 18 is obviated and withdrawal thereof is respectfully requested.

Claims 1-24 are rejected under 35 U.S.C. §103(a) as allegedly unpatentable over the '296 Patent in view of Marinchenko et al. The Examiner alleges that the '296 Patent discloses a process of preparing β -amylase from barley. The Examiner acknowledges that the '296 Patent does not disclose the use of cellulase enzyme in the preparation of the cereal β -amylase. However, the Examiner alleges that Marinchenko et al. disclose that treatment of barley malt with cellulase substantially increases the amylolytic activity of a barley preparation. Thus, the Examiner is of the opinion that one skilled in the art would have been motivated to treat the

barley material of Lehmussaari with cellulase having a reasonable expectation that the cellulase treatment would result in an increased amount of recoverable β -amylase.

In the first instance, Applicant respectfully submits that the present invention recognizes that the addition of cellulase in the aqueous medium for extracting β -amylase from cereal grains surprisingly improves the yield of β -amylase and reduces the extraction time. The specification discloses that cellulase "breaks down the surface structures underneath any husk of a living grain." See the specification, page 6, lines 15-16. The specification teaches that cereal grains in the present invention can be unhusked, dehusked, milled, ground or polished grains.

Applicant observes that in contrast to the present invention, the '296 Patent specifically requires not breaking the grain surface layers underneath the husk so that the layers can function as a filter to obtain a high yield β -amylase with minor impurities. Thus, the '296 Patent uses dehusked barley without any prior crushing or grinding of the grain.

Accordingly, Applicant respectfully submits that nowhere does the '296 Patent teach or suggest the use of cellulase in extracting β -amylase from cereal grains. Indeed, the '296 Patent actually teaches away from the use of any enzyme, such as cellulase, that can break down the surface layers underneath the husk. Therefore, one skilled in the art would not have been motivated to combine the '296 patent with the secondary reference to Marinchenko et al. in the first place, which reference teaches the use of cellulase.

Additionally, Applicant observes that Marinchenko et al. teach enhancing malt enzymatic activity. The malt contains germinated barley or millet, which is a milk-like mixture of various enzymes for saccharification of starch used in the brewing industry. The reference to Marinchenko et al. has nothing to do with extracting β -amylase but merely teaches increasing certain enzymatic activities by cellulase in a mixture of enzymes (free amylases in malt).

Marinchenko et al. also point out that the increase of free amylase would be beneficial in the saccharification of starch-containing raw material in the alcohol or brewing industries.

Marinchenko et al. propose the use of cellulose in order to increase the amylolytic activity in the process in which starch is dextrinated and saccharified to produce sugars (glucose, maltose) for brewing. Applicant submits that Marinchenko et al. teach a totally distinct process from the extraction of an enzyme from the grain and as such, it is irrelevant whether the grain is treated as a whole or is ground.

Applicant respectfully submits that in the process of the present invention, β -amylase is released from the grain and from the various parts of the grain, such as from the starch.

Applicant submits that the method of the present invention for isolating/extracting amylase free from the cereal is totally different from the method to utilize the cereal and its enzyme content for producing sugars from starch in the manner as taught by Marinchenko et al. Thus, a combination of the cited art would not achieve the present invention. One skilled in the art would not have been motivated to combine the cited art.

Moreover, Marinchenko et al. disclose that α -amylase in the grain is bound to the cell wall. Applicant respectfully submits that in view of Marinchenko et al., one skilled in the art would conclude that by degrading the cell wall, cellulase more likely increases α -amylase rather than β -amylase in the mixture. Thus, even assuming that one skilled in the art would have been motivated to combine the teachings of the cited art, one skilled in the art would not have had an expectation of success to achieve the present invention, i.e., extracting high yield β -amylase.

In view of the foregoing amendments and remarks, it is firmly believed that the subject application is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'F. S. DiGiglio', written over a horizontal line.

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